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10/664,772

09/17/2003

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10/11/2006

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EXAMINER

YUAN, DAH WEI D

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 10/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/664,772 | Applicant(s) MASEL ET AL. | |
| | Examiner Dah-Wei D. Yuan | Art Unit 1745 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-19, 21-23 and 51-63 is/are pending in the application.
- 4a) Of the above claim(s) 58-63 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-19, 21-23 and 51-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>09292006</u> . | 6) <input type="checkbox"/> Other: _____ |

ORGANIC FUEL CELLS AND FUEL CELL CONDUCTING SHEETS

Examiner: Yuan

S.N. 10/664,772

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October 5, 2006

Detailed Action

1. The Applicant's amendment filed on July 31, 2006 was received. The specification was amended. Claims 1-16,20,24-50 were cancelled. Claim 17 was amended. Claims 51-63 were added.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on April 27, 2006.

Election/Restrictions

3. Newly submitted claims 58-63 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: The subject matter of aforementioned claims is "an organic fuel cell comprising a gas remover comprising at least 5 passages penetrating at least one of said plurality of walls" in claim 58 and "an organic fuel cell comprising a gas remover comprising at least 5 passages penetrating at least one of said plurality of walls, each of said passages having an entrance that is separated from said at least one wall by a distance whereby said entrance extends into said anode enclosure" in claim 62, which are distinct species from the "a passive direct organic fuel cell comprising a gas remover comprising a plurality of passages that are configured to allow passage of CO₂ from said enclosure while substantially penetrating passage of said organic fuel solution, said plurality of passages

positioned to promote circulation of said organic fuel solution as gas travels therethrough” as recited in the original claims.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 53-68 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 102

4. The claim rejections under 35 U.S.C. 102(a) as anticipated by Ha et al. on claims 17-19,21 are withdrawn, because the independent claim 17 has been amended.

Claim Rejections - 35 USC § 102/103

5. The claim rejections under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Davis (US 5,904,740) on claims 17-19,21 are withdrawn, because the independent claim 17 has been amended.

Claim Rejections - 35 USC § 103

6. Claims 17,21,51-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 5,904,740) in view of Beckmann et al. (US 2003/0170508 A1).

With respect to claim 17,52, Davis teaches an organic/air fuel cell, wherein an organic fuel such as methanol, formaldehyde, or formic acid is oxidized to carbon dioxide at an anode,

while air or oxygen is reduced to water at the cathode. A solid polymer membrane of a perfluorinated proton-exchange membrane material, which is substantially impervious to the organic fuel solution, is disposed between the anode and the cathode. In one embodiment, methanol is used as the alcohol in the fuel and formic acid is added to the fuel as a carboxylic acid additive. The concentration of the formic acid is up to 20% by weight, i.e. about 43 M. See Abstract, Column 2, Lines 52-59, Column 4, Lines 59-67. Moreover, it is the position of the examiner that other properties of said fuel cell, such as power density, are inherent, given that the organic fuel cell disclosed by Davis and the present application having substantially the same anode, cathode, solid polymer membrane and organic fuels. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. In re Robertson, 49 USPQ2d 1949 (1999). Furthermore, it would have been obvious to one of ordinary skill in the art to adjust the concentrations of the methanol and formic acid in the liquid fuel solution disclosed by Davis in order to provide appropriate electrochemical performance and power density for specific applications.

The disclosure of Davis differs from Applicant's claims in that Davis does not disclose the anode enclosure has a gas remover comprising a plurality of passages that are configured to allow passage of CO₂ from the enclosure. Beckmann et al. teach a direct oxidation fuel cell wherein the anode chamber provides an opening (72) that allows the carbon dioxide exits the housing and a second opening (71) to allows the exit of dilute fuel and water. The opening can promote circulation of the fuel solution as gas travels therethrough. See Paragraph 41.

Moreover, the disclosure of Beckmann et al. differs from Applicant's claims in that Beckmann et al. do not describe the use of a plurality of passages (openings) to allow passage of CO₂ from the enclosure. However, the court has held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. See *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). Therefore, it would have been obvious to one of ordinary skill in the art to add a gas remover comprising a plurality of passages to the anode enclosure of Davis, because Beckmann et al. teach the use of such feature to remove the carbon dioxide in the anode enclosure. It is also noted that the organic fuel cell of Davis and Beckmann can be characterized as "passive" when the circulation of the fluid reactants is interrupted or terminated.

With respect to claim 21, it is well known in the art that anode and the solid polymer membrane are required to be held together by a sealant such that intimate contact between the two components can be established. It would be necessarily intrinsic that the sealant is resistant to the corrosion of formic acid in the organic liquid fuel.

With respect to claim 51, it is the position of the examiner that disclosure provides no evidence of criticality with regard to the numbers of passages in the enclosure. Also, the court has held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. See *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

With respect to claims 53-57, it would have been an obvious matter of design choice to manufacture these passages into specific dimension, length to diameter ratio and location absent persuasive evidence that the particular configuration of the claimed enclosure is significant. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

7. Claims 18,19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 5,904,740) and Beckmann et al. (US 2003/0170508 A1) as applied to claims 17,21 above, and further in view of Ha et al. (J. Power Source 112 (2002) 655-659).

The disclosure of Davis and Beckmann differs from Applicant's claims in that Davis and Beckmann does not disclose the fuel solution is at least 4.4 or 8.8 M formic acid. Ha et al. teach the use of methanol and formic acid as the fuel for fuel cells. The use of 9 M formic acid and methanol can increase the current at 60°C from 95 to 320 mA/cm² at 0.3V. The maximum power density increases from 33 to 119 mW/cm². The cell resistance decreases from 0.37 to 0.32 cm². See abstract, page 655-656. Therefore, it would have been obvious to one of ordinary skill in the art to use 9 M formic acid and methanol as the fuel onto the fuel cell of Davis and Beckmann, because Ha et al. teach the use of such fuel can improve the performance of the organic fuel cell.

8. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 5,904,740) and Beckmann et al. (US 2003/0170508 A1) as applied to claims 17,21 above, and further in view of Hirsch et al. (US 6,924,055 B2).

Davis describes a direct organic fuel cell as described in Paragraph 5 above. However, Davis does not teach or suggest the fuel cell further comprising replaceable fuel cartridge. Hirsch et al. teach a fuel cell system comprising a replaceable fuel cartridge (4), which is connected to the fuel cell via a duckbill valve (55). The fuel cartridge that provides fuel to the anode can reduce the risk of cathode flooding and keep the cost and complexity of the fuel cell to

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a minimum. See Column 3, Lines 47-51; Column 9, Lines 45-60. Therefore, it would have been obvious to one of ordinary skill in the art to add a replaceable fuel cartridge to the fuel cell of Davis, because Hirsch et al. teach the use of a fuel cartridge to reduce the risk of cathode flooding and keep the cost and complexity of the fuel cell to a minimum.

9. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 5,904,740) and Beckmann et al. (US 2003/0170508 A1) as applied to claims 17,21 above, and further in view of Vecere (US 5,898,113).

Davis and Hirsch describe a direct organic fuel cell as described in Paragraphs 5 and 6 above. However, Davis and Hirsch do not teach or suggest the fuel cartridge is made of a PTFE material. Vecere et al. teach a sealed container that is typically made of an inert material such as TEFLON and TEDLAR. See Column 1 Lines 17-26. Therefore, it would have been obvious to one of ordinary skill in the art to use a replaceable fuel cartridge made of PTFE in the fuel cell system of Davis and Beckmann, because Vecere teaches the container made of TEFLON is inert to the environment.

Double Patenting

10. The claims rejections under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of copending Application No. 10/407,385 are withdrawn because the independent claim 17 has been amended.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei D. Yuan whose telephone number is (571) 272-1295. The examiner can normally be reached on Monday-Friday (8:00-5:00).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dah-Wei D. Yuan
October 5, 2006



DAH-WEI YUAN
PRIMARY EXAMINER